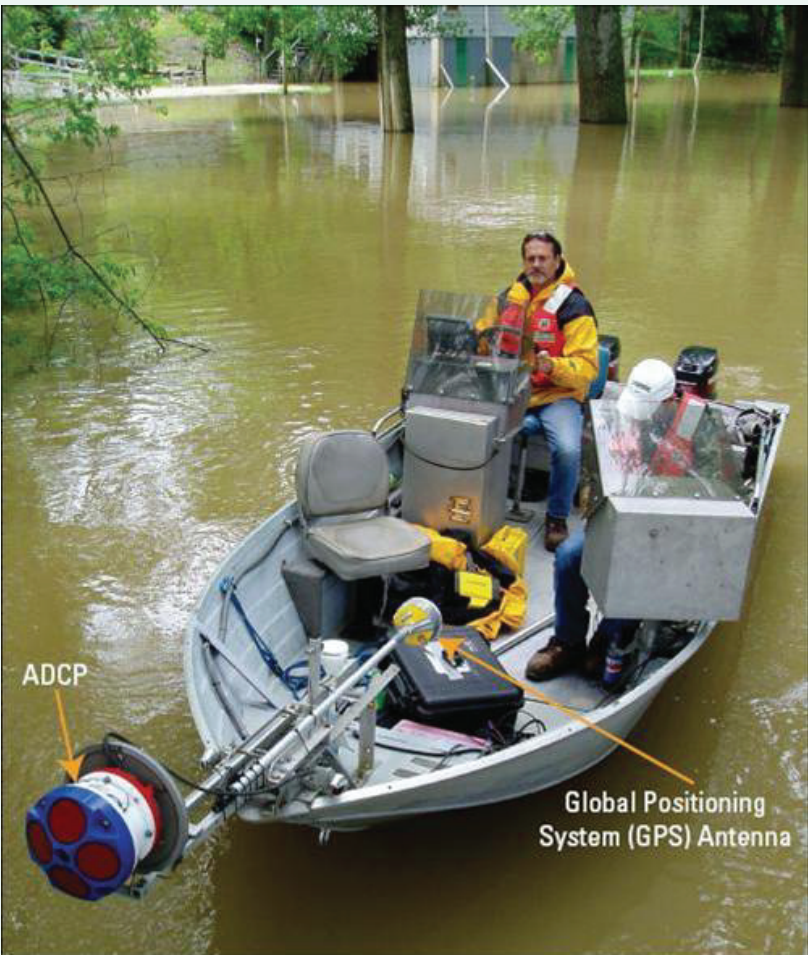
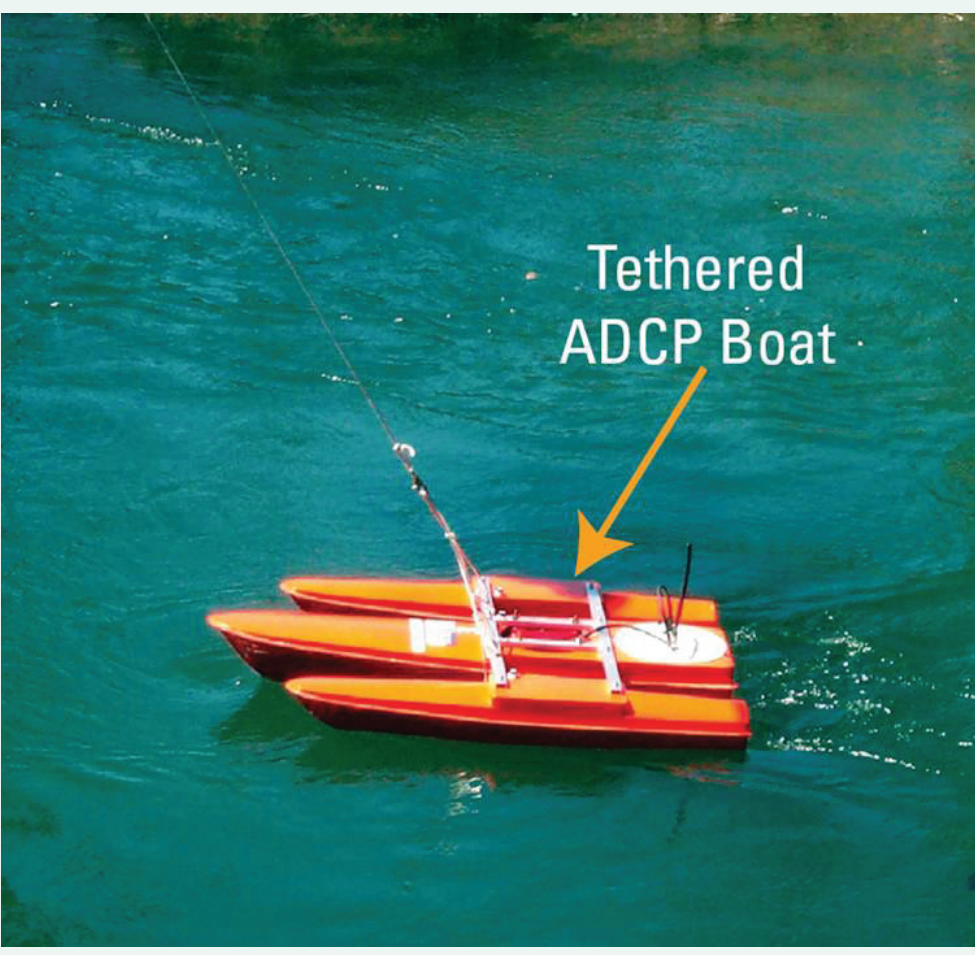


NEW TECHNOLOGIES USED BY THE U. S. GEOLOGICAL SURVEY FOR STREAMGAGING



An Acoustic Doppler Current Profiler (ADCP) is mounted from a boat to measure water depth and a velocity profile. The position in the stream is tracked by GPS. These attributes are used to compute stream discharge.

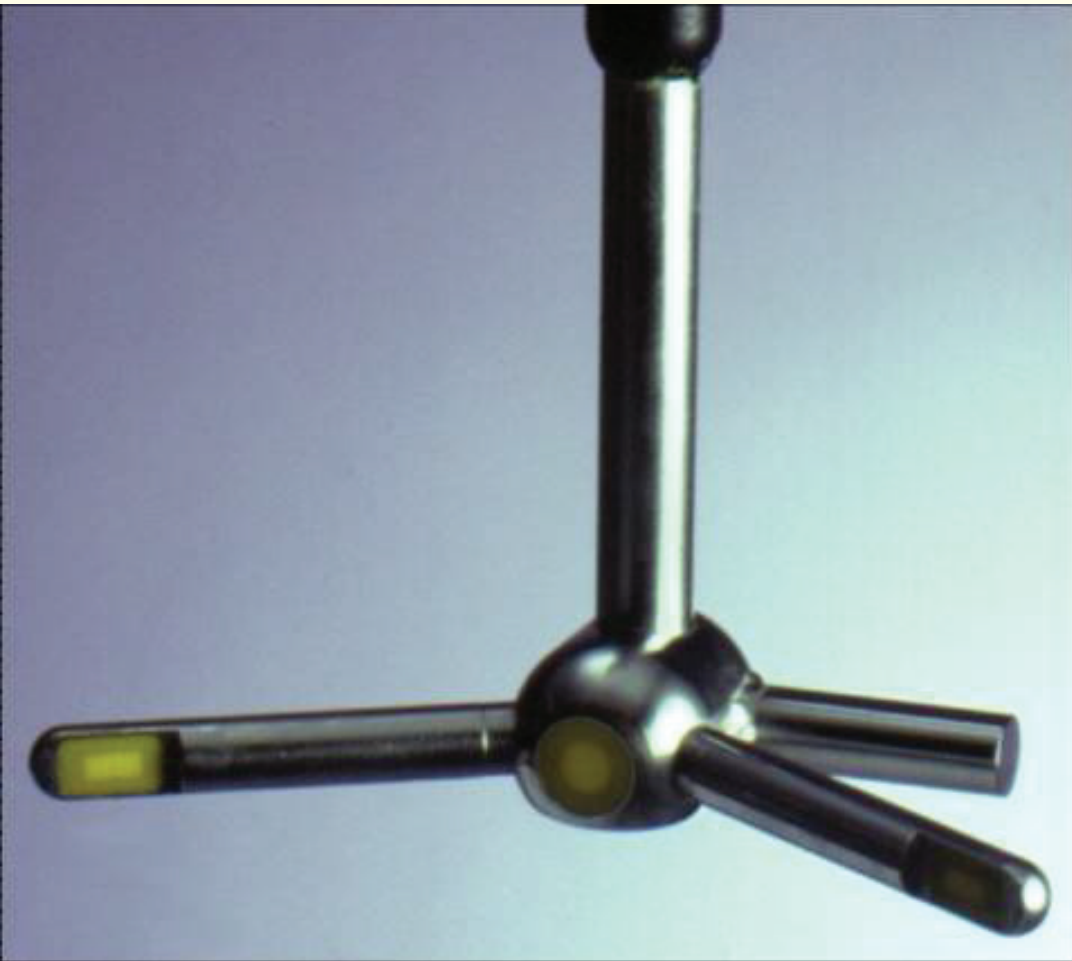


Acoustic Doppler Current Profilers (ADCPs) are instruments used to measure water velocities, direction of flow, and depth. Transducers on the ADCP operate at fixed ultrasonic frequency, typically at 300, 600, or 1,200 kilohertz. Water velocity is measured by transmitting the sound into the water and measuring the Doppler shift, or change in sound frequency, from signals reflected off particles in the water. The primary advantages of measuring discharge using the ADCP compared with mechanical point-velocity meters are (1) less time is required, (2) data are collected throughout the water column and cross section rather than at discrete points, (3) tethered and boat-mounted units reduce the risk of snagging debris during floods, (4) complex flow regimes such as vertical and bidirectional flow can be identified and measured, and (5) a number of parameters are available for analyzing measurement quality.

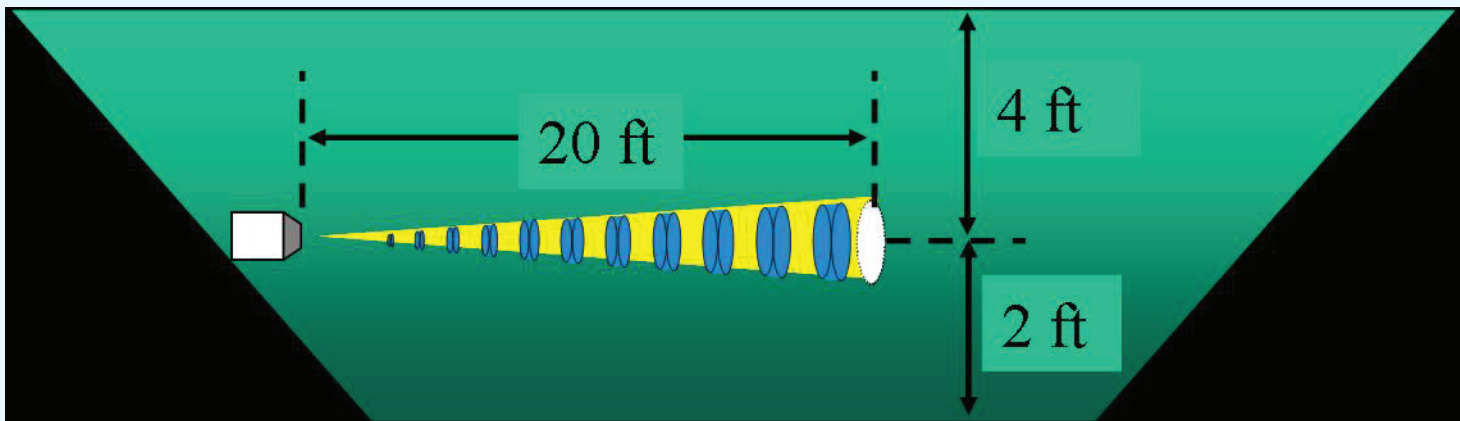
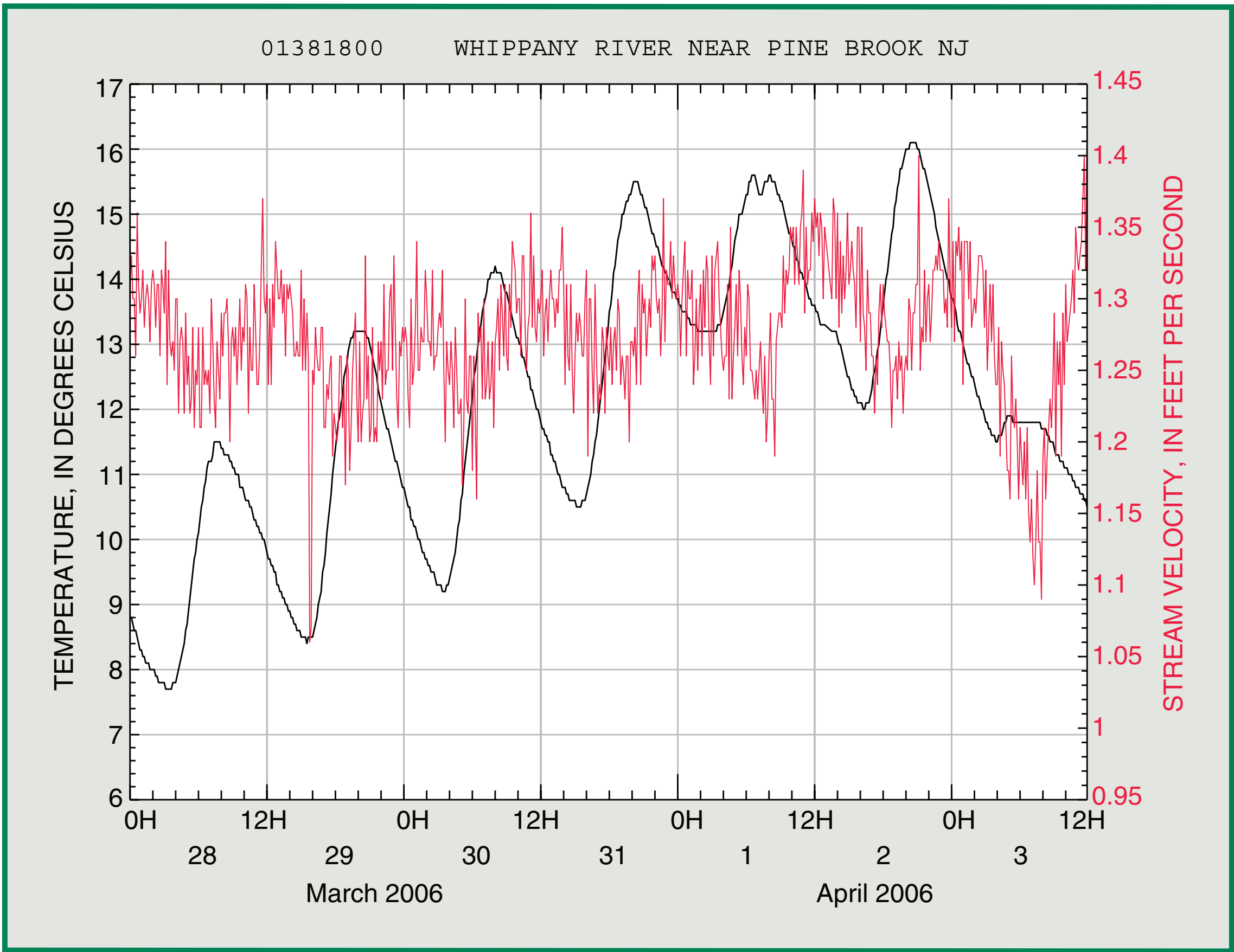
Radar non-contact stage sensors are used to measure water-surface elevations by transmitting microwave signals from a distance above the water surface. The reflected signals are received and evaluated to determine the distance to the water surface. The equipment can be mounted to a bridge, eliminating the need for construction of a gaging-station shelter with a stilling well.



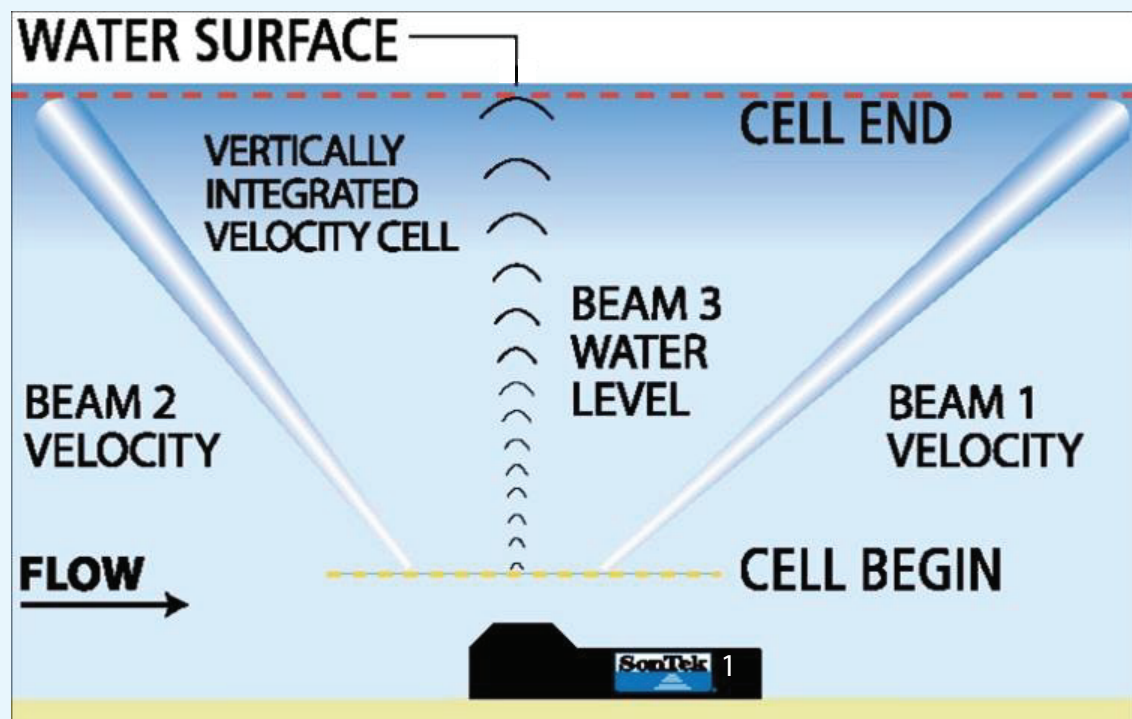
A microwave transmitter is aimed at the water surface from a bridge. The echo received by the sensor is evaluated to determine distance to the water surface. The distance is used to determine the water-surface elevation.



An Acoustic Doppler Velocimeter uses sound waves to measure water velocity during wading discharge measurements. A portable model is shown mounted to a top setting rod.



Acoustic Doppler Velocity Meters record water velocity, direction of flow, depth, and temperature. They are permanently mounted below the water surface in streams and estuaries.



Bridge-Mounted Radar Gun



Handheld Radar Gun

Radar sensors compute surface velocity. Surface velocity is related to the mean velocity in the channel. Velocity and cross-sectional area are multiplied to compute discharge.

¹ Any use of trade, product or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government